# Addendum to manual

# PLN-24CH12 / PRS-48CH12

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## 1 General

This addendum to the manual of the PLN-24CH12 and PRS-48CH12 chargers contains important information for proper installation and operation.

## 2 Battery capacity

It is not recommended to use batteries with a capacity of less than 100 Ah. Smaller batteries have a relatively high initial internal resistance ($R_i$), that may exceed the threshold for supervision of $R_i$ and cause a fault. Also, when batteries age, their capacity decreases and their $R_i$ goes up.

## 3 $R_i$-monitoring

The PLN-24CH12 and PRS-48CH12 battery chargers have built-in $R_i$ monitoring. This is important and mandatory for compliance to EN54-4. It means that the charger monitors the summed resistance of the wiring, fuse, electrical connections and the $R_i$ of the battery. It warns the user when the battery has aged and must be replaced. The $R_i$ supervision threshold has been selected such that when the $R_i$ of the battery has increased to the maximum allowed value the backup power system can still power the VACIE.

Because the resistance of the wiring and the connections is incorporated into the measured $R_i$, it is important that these resistances are very low, otherwise even good batteries will generate a fault. This makes sense because a VACIE can take up to 150 A from the battery and then every 10 mohm will already cause a voltage drop of 1.5 V, limiting the maximum available output power from the VACIE.

## 4 Wire gauge selection

As installer, you should take into consideration all major contributors to the total resistance, being:

- Battery $R_i$ – typically 5 to 6 mohm per battery, depending on size and make.
- Cables – very dependent on length and gauge.
- Battery fuse – typically 1 to 2 mohms.
- Connections – typically 1 mohm.

The actual values need to be checked with the battery supplier and fuse supplier. Also be aware of possible influences of connections, e.g. pay attention to screw-tightening of connections.

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Keep some margin to avoid false positive faults. Stay at least 20% below the selected $R_i$-limit, because there is some tolerance on the measurement accuracy.
To help you selecting the right cable gauge, two tables are provided with maximum cable lengths per wire gauge for a number of battery types. Use this guideline to determine the needed gauge.

The first table is for 24 V battery systems and the second table is for 48V battery systems. The maximum length is given in cm and depicts the total cable length, i.e. all the wire length from charger to battery, the bridges to connect the batteries in series and the length back to the charger. Five different cable gauges are shown with cross-sectional areas of 6 $mm^2$ to 35 $mm^2$. Then two different jumper settings can be selected for the threshold of the $R_i$-supervision of the charger, the 50 mohm setting is intended for loads up to 100 A, the 75 mohm setting for loads up to 150 A.
Allow for up to 5 hours for the unit to report a battery fault.

In some cases the maximum resistance is already exceeded, even for zero length cables. This is not allowed and indicated as n.a. (not allowed).

Maximum total cable length to battery and return (cm)

| 24V | | | Cable gauge | 6 $mm^2$ | | 10 $mm^2$ | | 16 $mm^2$ | | 25 $mm^2$ | | 35 $mm^2$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jumper setting (mohm) | 50 | 75 | 50 | 75 | 50 | 75 | 50 | 75 | 50 | 75 |
| C20 | Brand | Type | | 100A | 150A | 100A | 150A | 100A | 150A | 100A | 150A | 100A | 150A |
| 105 Ah | Long | 6FM100G/B | | 108 | 3 | 181 | 6 | 289 | 9 | 451 | 14 | 632 | 19 |
| 120 Ah | Effekta | BTL12-120 | | 142 | 37 | 236 | 61 | 378 | 98 | 590 | 153 | 826 | 214 |
| 120 Ah | Fiamm | FG2C007 | | 188 | 83 | 314 | 139 | 502 | 222 | 785 | 347 | 1099 | 486 |
| 121 Ah | Long | 6FM115G/B | | 108 | 3 | 181 | 6 | 289 | 9 | 451 | 14 | 632 | 19 |
| 126 Ah | Long | 6FM120G/B | | 142 | 37 | 236 | 61 | 378 | 98 | 590 | 153 | 826 | 214 |
| 130 Ah | Yuasa | NPL130-6IFR | | 108 | 3 | 181 | 6 | 289 | 9 | 451 | 14 | 632 | 19 |
| 150 Ah | Effekta | BTL12-150 | | 142 | 37 | 236 | 61 | 378 | 98 | 590 | 153 | 826 | 214 |
| 150 Ah | Fiamm | FG2F009 | | 205 | 100 | 342 | 167 | 547 | 267 | 854 | 417 | 1196 | 583 |
| 200 Ah | Effekta | BTL12-200 | | 142 | 37 | 236 | 61 | 378 | 98 | 590 | 153 | 826 | 214 |
| 200 Ah | Fiamm | FG2M009 | | 222 | 117 | 369 | 194 | 591 | 311 | 924 | 486 | 1293 | 681 |
| 200 Ah | Yuasa | NPL200-6 | | 188 | 83 | 314 | 139 | 502 | 222 | 785 | 347 | 1099 | 486 |
| 210 Ah | Long | 6FM200G/B | | 175 | 70 | 292 | 117 | 467 | 187 | 729 | 292 | 1021 | 408 |

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| 48V | | Cable gauge | 6 mm² | | 10 mm² | | 16 mm² | | 25 mm² | | 23 mm² | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jumper setting (mohm) | 50 | 75 | 50 | 75 | 50 | 75 | 50 | 75 | 50 | 75 |
| C20 | Brand | Type | 100A | 150A | 100A | 150A | 100A | 150A | 100A | 150A | 100A | 150A |
| 65 Ah | Effekta | BTL12-65 | 175 | n.a. | 292 | n.a. | 467 | n.a. | 729 | n.a. | 1021 | n.a. |
| 65 Ah | Fiamm | FG26505 | 342 | n.a. | 569 | n.a. | 911 | n.a. | 1424 | n.a. | 1993 | n.a. |
| 65 Ah | Fiamm | FG26507 | 342 | n.a. | 569 | n.a. | 911 | n.a. | 1424 | n.a. | 1993 | n.a. |
| 65 Ah | PowerSonic | PS12650GB | 88 | n.a. | 147 | n.a. | 236 | n.a. | 368 | n.a. | 515 | n.a. |
| 65 Ah | Yuasa | NP65-12 | 208 | n.a. | 347 | n.a. | 556 | n.a. | 868 | n.a. | 1215 | n.a. |
| 68 Ah | Long | 6FM65G/B | 108 | n.a. | 181 | n.a. | 289 | n.a. | 451 | n.a. | 632 | n.a. |
| 70 Ah | ABT | TM12-320W | 280 | n.a. | 467 | n.a. | 748 | n.a. | 1168 | n.a. | 1635 | n.a. |
| 70 Ah | Fiamm | FG27004 | 235 | n.a. | 392 | n.a. | 627 | n.a. | 979 | n.a. | 1371 | n.a. |
| 70 Ah | Fiamm | FG27007 | 335 | n.a. | 558 | n.a. | 893 | n.a. | 1396 | n.a. | 1954 | n.a. |
| 73 Ah | Long | 6FM70G/B | 175 | n.a. | 292 | n.a. | 467 | n.a. | 729 | n.a. | 1021 | n.a. |
| 75 Ah | ABT | TM12-350W | 285 | n.a. | 475 | n.a. | 760 | n.a. | 1188 | n.a. | 1663 | n.a. |
| 75 Ah | Effekta | BTL12-75 | 195 | n.a. | 325 | n.a. | 520 | n.a. | 813 | n.a. | 1138 | n.a. |
| 75 Ah | PowerSonic | PS12750GB | 135 | n.a. | 225 | n.a. | 360 | n.a. | 563 | n.a. | 788 | n.a. |
| 78 Ah | Yuasa | NPL78-12IFR | 242 | n.a. | 403 | n.a. | 644 | n.a. | 1007 | n.a. | 1410 | n.a. |
| 80 Ah | Effekta | BTL12-80 | 208 | n.a. | 347 | n.a. | 556 | n.a. | 868 | n.a. | 1215 | n.a. |
| 80 Ah | Fiamm | FG28009 | 348 | n.a. | 581 | n.a. | 929 | n.a. | 1451 | n.a. | 2032 | n.a. |
| 84 Ah | Long | 6FM80G/B | 175 | n.a. | 292 | n.a. | 467 | n.a. | 729 | n.a. | 1021 | n.a. |
| 90 Ah | Effekta | BTL12-90 | 228 | 18 | 381 | 31 | 609 | 49 | 951 | 76 | 1332 | 107 |
| 100 Ah | Effekta | BTL12-100 | 242 | 32 | 403 | 53 | 644 | 84 | 1007 | 132 | 1410 | 185 |
| 100 Ah | Fiamm | FG2A007 | 368 | 158 | 614 | 264 | 982 | 422 | 1535 | 660 | 2149 | 924 |
| 100 Ah | PowerSonic | PS121000GB | 248 | 38 | 414 | 64 | 662 | 102 | 1035 | 160 | 1449 | 224 |
| 100 Ah | Yuasa | NPL100-12 | 308 | 98 | 514 | 164 | 822 | 262 | 1285 | 410 | 1799 | 574 |
| 105 Ah | Long | 6FM100G/B | 242 | 32 | 403 | 53 | 644 | 84 | 1007 | 132 | 1410 | 185 |
| 120 Ah | Effekta | BTL12-120 | 308 | 98 | 514 | 164 | 822 | 262 | 1285 | 410 | 1799 | 574 |
| 120 Ah | Fiamm | FG2C007 | 402 | 192 | 669 | 319 | 1071 | 511 | 1674 | 799 | 2343 | 1118 |
| 121 Ah | Long | 6FM115G/B | 242 | 32 | 403 | 53 | 644 | 84 | 1007 | 132 | 1410 | 185 |
| 126 Ah | Long | 6FM120G/B | 308 | 98 | 514 | 164 | 822 | 262 | 1285 | 410 | 1799 | 574 |
| 130 Ah | Yuasa | NPL130-6IFR | 242 | 32 | 403 | 53 | 644 | 84 | 1007 | 132 | 1410 | 185 |
| 150 Ah | Effekta | BTL12-150 | 308 | 98 | 514 | 164 | 822 | 262 | 1285 | 410 | 1799 | 574 |
| 150 Ah | Fiamm | FG2F009 | 435 | 225 | 725 | 375 | 1160 | 600 | 1813 | 938 | 2538 | 1313 |
| 200 Ah | Effekta | BTL12-200 | 308 | 98 | 514 | 164 | 822 | 262 | 1285 | 410 | 1799 | 574 |
| 200 Ah | Fiamm | FG2M009 | 468 | 258 | 781 | 431 | 1249 | 689 | 1951 | 1076 | 2732 | 1507 |
| 200 Ah | Yuasa | NPL200-6 | 402 | 192 | 669 | 319 | 1071 | 511 | 1674 | 799 | 2343 | 1118 |
| 210 Ah | Long | 6FM200G/B | 375 | 165 | 625 | 275 | 1000 | 440 | 1563 | 688 | 2188 | 963 |